

Bryan, Joseph (DEQ)

From: Thomas Pakurar <handsacrossthelake@comcast.net>
Sent: Wednesday, July 20, 2016 1:51 PM
To: Chesterfield Power Station Water Permit (DEQ)
Subject: Permit Comments due 7/21/2016
Attachments: Sampling in Farrar Gut.pdf; CEN A New Life For Coal Ash copy February 15, 2016 Issue - Vol. 94 Issue 7 Chemical & Engineering News.pdf

Permit comments below:

1. Samples of James River water near the discharge outfalls of the Chesterfield Power Plant taken 4/5/16 by HAL (after 0.26" rain) and 10//2015 by Duke University show toxic levels of arsenic, chromium and lead in the water. Sampling data, details of collection and analysis was submitted to Kyle Winter, P.E. of DEQ on July 5, 2016 and are attached to this email to be made part of the public comments.
2. Please investigate the 4/5/16 sample incident and advise me of the results of the investigation. The samples were taken after 0.26 inches of rain had fallen that day.
3. If appropriate please suggest legislative changes needed to prevent recurrence.
4. Simplify the data taken for the permit by using direct measurements (versus calculations) of metal toxins taken at the interface between private and public property. Use the format of Permit No. VA0060194 for Proctors Creek Wastewater Treatment Plant next door on the James.
5. Require taking discharge data or a visual sample at all process and stormwater discharge outlets after each rainfall of 1/4 inch or more to ensure a quick response if there is a water quality violation.
6. Specify more stringent stormwater standards, like those in Appendix 1, that will coalesce the mico-sized particles in fly ash into larger agglomerates that would be better managed by the stormwater regs. It is important to require full treatment of wastewater prior to being discharged into the James River.
7. Specify strong protections for endangered species such as the Atlantic Sturgeon fish.
8. Specify rules that encourage encapsulation of all flyash or its removal from flood plain storage.


I have attached the following files as part of this public comment:

Sampling in Farrar Gut: letter to DEQ Kyle Winters, 7/5/16;
C&EN News, 94:7, pp 10-14, February 15, 2016, "A New Life for Coal Ash."

Sincerely,

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COVER STORY 

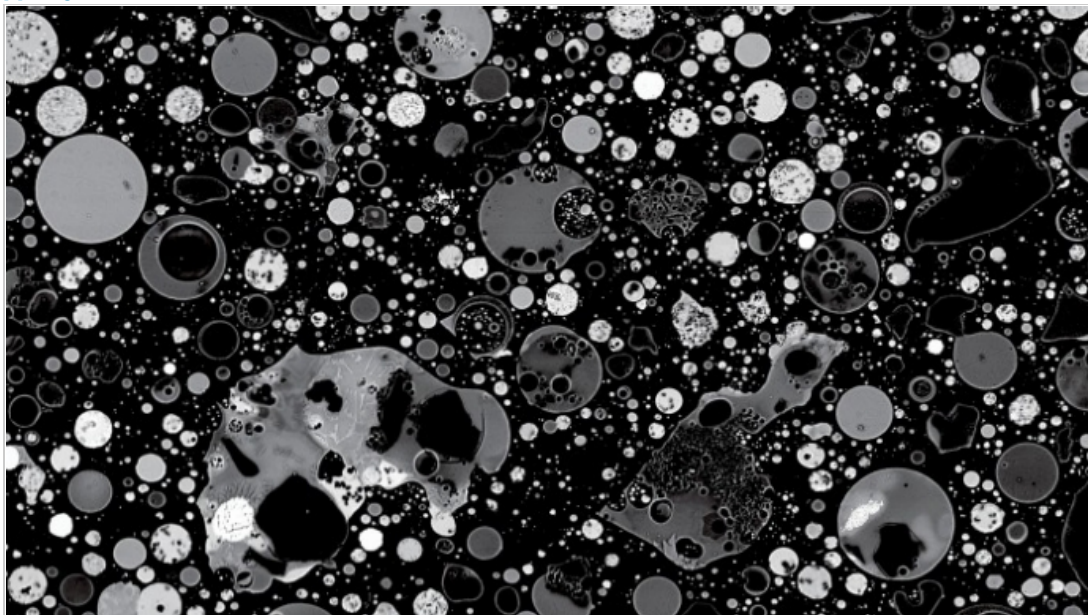
A New Life For Coal Ash

Sustainability: Electric utilities, environmentalists, researchers, and regulators converge on sustainable solutions for recycling waste from coal-fired power plants

By [Stephen K. Ritter](#)

Department: [Science & Technology](#)
News Channels: [Materials SCENE](#), [Environmental SCENE](#)
Keywords: [coal ash](#), [recycling](#), [concrete](#), [wallboard](#), [sustainability](#)

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INSIDE ASH

Fly ash particles have a glasslike quality and are generally spherical, ranging in size from 0.5 μm to 300 μm , as shown in this SEM image.

Credit: Wikimedia Commons

In December 2008, a dike collapsed at a waste storage pond at the Tennessee Valley Authority's [Kingston power plant](#) in northeastern Tennessee. The incident released more than 3.8 billion L of water containing 4.1 million m^3 of coal ash, which is the cremated remains of burning coal. The spill inundated several homes and contaminated the Emory River. The cleanup, which took until 2015 to complete, cost \$1.1 billion.

The Kingston incident points to modern society's biggest dilemma: In pursuit of our greatest need—generating electricity—we generate an unsustainable amount of pollution. In the case of burning coal, we regularly lament the amount of carbon dioxide being pumped into the atmosphere. But we tend to forget that other substances emitted by burning coal—including sulfur, mercury, and coal ash—are piling up on the ground.

Coal ash is the second-largest waste material in the U.S. behind household trash. Utility companies and the ash management firms working for them struggle to find economic ways to get rid of it. In the U.S., about half of the material is recycled in useful applications such as making concrete and gypsum wallboard. But the volume of coal ash produced and the economics of handling

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it is such that the other half must be disposed of as waste.

That means keeping it in large storage ponds like the one at Kingston or buried in landfills, which if not managed properly can **leak out contaminants over time** and cause an array of environmental problems. Power companies, environmental groups, scientists and engineers, and legislators and regulators have converged to come up with mutually acceptable solutions.

But finding such solutions has proved difficult. On one hand, antioal environmental advocacy groups say coal ash poses unacceptable health and environmental risks and the best solution is to treat it as hazardous waste and lock it all away in lined ponds and capped landfills. The alkaline ash contains small amounts of toxic dioxins and polyaromatic hydrocarbons, along with traces of toxic metals—substances that could end up in drinking water.

On the other hand, utility companies say the best solution for the disposal problems, which will also help manage their operating costs, is to quit throwing coal ash away. Instead they want help finding affordable, value-added uses for the material.

The Environmental Protection Agency has been caught in the middle. EPA has spent decades evaluating coal ash safety. Sparked by the Kingston disaster, the agency developed **a new set of rules** that went into effect in October on coal ash management under the Resource Conservation & Recovery Act, which is the nation's primary law on handling solid waste.

The rules continue to regulate coal ash as nonhazardous solid waste as before. In tests, contaminants in the ash rarely breach federal hazardous waste criteria, such as exceeding safe levels for drinking water. What's new is that the rules stipulate more stringent standards for handling and disposing of coal ash and clarify how the rules will be enforced. The results, so far, seem to have left all parties involved in the issue unsatisfied.

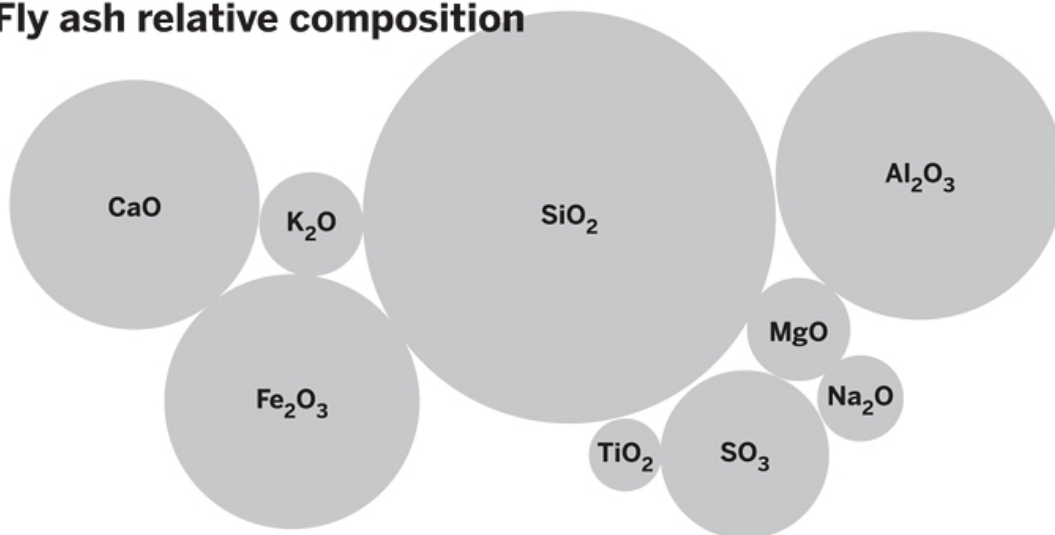
Marc Yaggi, executive director of the **Waterkeeper Alliance**, was blunt in his criticism. "How could EPA conclude that coal ash, which is loaded with carcinogens, including arsenic, cadmium, and chromium, is not a hazardous waste?" he said in a statement in response to the EPA announcement. "The rules fall far short of what is needed."

"The regulatory uncertainty over the years has caused more ash to be disposed of rather than recycled," counters **Thomas H. Adams**, executive director of the **American Coal Ash Association** (ACAA), an industry group. "It's been more about political science than real science."

NOTE: All graphic data reported in short tons (1 short ton = 0.9 metric tons).

COAL ASH BY THE NUMBERS

Fly ash relative composition



Trace elements^a: Ba, Sr, B, Mn, Zn, V, Cr, As, Pb, Ni, Cu, Mo, Ti, Be, U, Se, Sb, Cd, Hg

NOTE: Circles represent mean concentrations for various fly ash samples, for example, SiO₂ = 215,000 mg/kg.

a In order of relative abundance. **SOURCE:** Electric Power Research Institute

Coal ash breakdown



Coal ash
is the
**second-
most
abundant**

White paper

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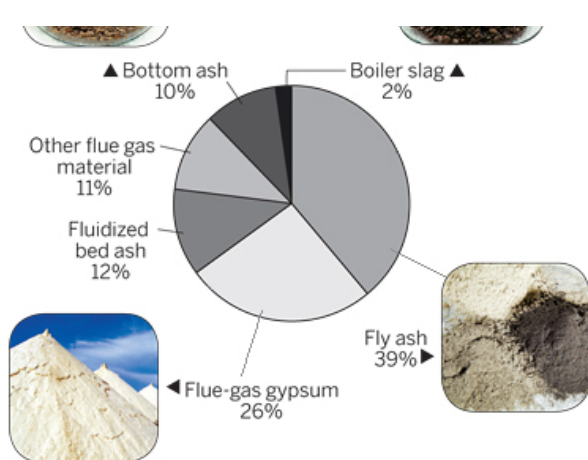
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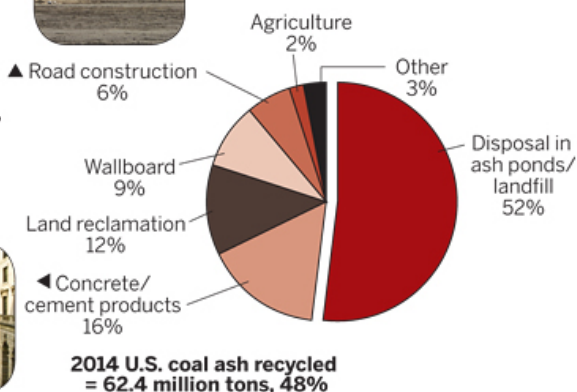


2014 U.S. coal ash production = 129.7 million tons per year



This Asheville, N.C., airport taxiway was constructed with coal ash fill.

The Ronald Reagan building in Washington, D.C. was built with coal ash concrete.



2014 U.S. coal ash recycled = 62.4 million tons, 48%

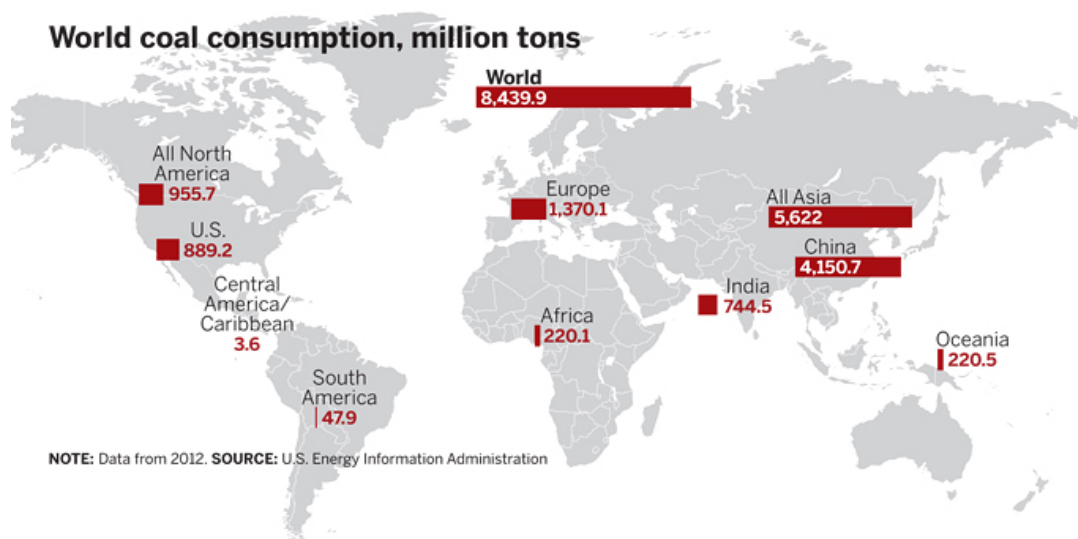
SOURCE: American Coal Ash Association

abundant waste material in the U.S. behind household trash.

About 1.5 billion tons of coal ash are currently stockpiled in the U.S.

Burning 4 to 8 tons of coal produces 1 ton of coal ash.

World coal consumption, million tons



NOTE: Data from 2012. SOURCE: U.S. Energy Information Administration

Zooming In On Coal Ash

Coal ash is the mineralized residue left over from burning coal to generate electricity. It's actually a collection of different types of materials, called coal combustion products or coal combustion residuals: fly ash, flue gas desulfurization products, bottom ash, and boiler slag. The type and

[\[+\]Enlarge](#)

amount produced depends on the kind of coal used and the type of furnace and combustion process.

According to ACAA, in 2014 U.S. coal power plants generated **129.7 million tons of coal ash**. Of that amount, 62.4 million tons of the material, or 48%, was recycled. The remainder was disposed of in storage ponds or landfills.

Elsewhere in the world, coal ash management varies from country to country, ACAA's Adams notes. In some European countries, such as Denmark, where there is no landfill space, all the ash is recycled. China provides subsidies to promote coal ash recycling, reaching recycling rates of 60%, according to the Asian Coal Ash Association. But the country produces about five times as much coal ash as the U.S., meaning a large volume of material is still treated as waste.

Scientists have poked and prodded coal ash for at least a century seeking remedies. Fly ash, the most abundant material, is a fine powder made up of particles that are trapped by electrostatic precipitators or fabric filters as flue gas from a coal furnace makes its way to a smokestack.

The ash is primarily made up of silicon, aluminum, calcium, and iron oxides, with lesser amounts of other metal oxides and sulfur. It also contains traces of mercury, cadmium, chromium, lead, arsenic, and other metals, as well as boron, nitrates, and fluoride. The composition is similar to common rocks and soils, as well as volcanic ash, which has been used as a construction material as far back as the ancient Romans.

Today, about half the concrete produced in the U.S. contains some fly ash—up to 40%—as a substitute for limestone-based portland cement. Among other applications, fly ash is used as material to make bricks, ceramic tiles, and plaster; as filler in metal and plastic composites and in paints and adhesives; and as structural fill for road construction.

Flue gas desulfurization products rank as the second most abundant type of coal ash. Utilities install equipment, commonly known as scrubbers, to trap sulfur oxides, nitrogen oxides, and **other pollutants**—emissions that contribute to acid rain and other environmental problems. In the case of sulfur, when the flue gas contacts a calcium-based sorbent such as limestone in a scrubber, the reaction forms hydrated calcium sulfate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), or gypsum. A host of other flue gas desulfurization materials are formed in various other scrubbers.

The synthetic gypsum is used like natural mined gypsum to produce wallboard, also known as drywall or Sheetrock. About half of wallboard manufactured in the U.S. is produced from power plant gypsum, according to ACAA. The recovered gypsum is also used in agriculture as a soil conditioner and to neutralize acidic soils.

Among other coal ash materials, bottom ash is a coarse material too large to float in the flue gas, so it falls through grates into a hopper in the bottom of the coal furnace. It's typically used as filler in concrete and as fill material for road construction. Boiler slag is molten bottom ash that turns into pellets with a smooth glassy appearance after it is cooled with water. It's useful as grit for sandblasting and polishing, roofing shingles, filler in asphalt, and a substitute for sand in snow and ice traction control.

Beyond these large-scale uses, there are few economic opportunities for recycling coal ash, Adams says. China extracts aluminum from coal ash. And the U.S. and China are also looking at whether it's **practical to extract other metals**, such as rare-earth elements for electronics, uranium for nuclear power, and lithium for batteries—even gold. But these trace-metal extractions would require sifting through thousands of tons of ash to garner usable amounts of the metals, and the extracted ash would still remain.

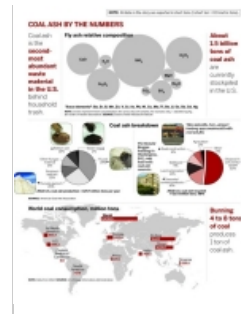
Regulatory Dilemma

Since the 1980s, EPA has periodically issued reports concluding that coal ash is not hazardous and doesn't need to be regulated as such. The agency has set up guidelines for handling coal ash as solid waste, similar to household trash, and has encouraged recycling. How the waste is actually handled is left up to individual states, subject to EPA approval.

The regulatory process has been fraught with contentious debate, as utility companies and environmental advocacy groups have sought the upper hand in their arguments for and against coal ash. The points of conflict include the hazardous/nonhazardous designation and how the regulations should be enforced—at the federal level or the state level. The current laws governing coal ash management rely on so-called citizen lawsuits, in which individuals or groups who believe violations are occurring must go to court to force EPA, the states, or utilities to abide by the rules.

Meanwhile, coal ash has been piling up. According to EPA, unused coal ash in the U.S. is currently disposed of in more than 735 ponds averaging more than 50 acres in size with an average depth of 6 meters, and in more than 310 landfill sites averaging 120 acres in size and an average depth of 12 meters. According to ACAA, roughly 1.5 billion tons of coal ash are already socked away. As environmental incidents involving coal ash storage began increasing in frequency starting in the 1990s, EPA was increasingly pressed to act further. The 2008 Kingston spill was the straw that broke the camel's back.

So after further study, last year EPA updated its coal ash rules. Aside from reinforcing the agency's nonhazardous waste determination, and leaving the door open for recycling, the rules call for remediating existing ash ponds and landfills that fail to meet the new disposal standards. For example, sites without impermeable liners to prevent material leaching into groundwater will need to be closed. That means the millions of liters of water in ponds will be removed and treated, then likely diverted into nearby streams. The ash that remains will be shunted off into recycling applications or moved to new lined landfills.



PDF DOWNLOAD

Download a PDF of the graphic above [here](#).

Electric utilities welcome the new rules as helpful, because the rules will open the damper on recycling efforts, ACAA's Adams explains. If coal ash were labeled hazardous, he says, utilities likely would forgo recycling and dispose of the material as waste to avoid liability for its use in new products.

Even so, the ability to use coal ash still depends on the quality of the material and the results of a cost-benefit analysis, Adams notes. On the plus side, anytime coal ash is used in lieu of a virgin natural material such as portland cement, it reduces a portion of the fossil energy required, pollution generated, and ecological burden to mine, transport, and process those materials. For example, for every ton of fly ash used in place of portland cement, about 1 ton of CO₂ emissions is eliminated, Adams says, citing EPA estimates. That's equivalent to about two months' emissions from an automobile. But there's a short leash on those benefits, Adams adds. Companies must invest in infrastructure to use coal ash in concrete and wallboard, he explains, and if a company has to transport ash more than about 80 km for structural fill applications, it sometimes isn't worth the effort and the company must dispose of the ash instead.

Beyond the economics, fly ash is beneficial in construction and as structural fill for its physical properties. For example, its composition reduces the amount of cement and water needed to make concrete and produces denser concrete with improved mechanical and chemical properties that make it stronger and more durable. For example, fly ash can nearly double the life of a highway, according to ACAA. And for synthetic gypsum, the material made at power plants is typically higher purity than mined gypsum, making it preferable for wallboard.

"We have by no means hit the ceiling in terms of market potential for coal ash," Adams says. "Now that we have regulatory certainty, investment will start moving back into the infrastructure we need to grow coal ash recycling," he notes. "That's good news for the coal ash industry."

New Opportunities

One potential use for coal ash, ironically, is to help clean up old coal mines. Civil engineers [Tarunjit S. Butalia](#) and [Chin-Min Cheng](#) of Ohio State University are studying whether flue gas desulfurization materials could be used to mitigate acidic drainage from hundreds of abandoned coal mining operations in their state.

After a mine is abandoned, groundwater continues to percolate through boundaries in coal seams, picking up minerals, most commonly pyrite (FeS₂), Butalia and Cheng explain. Once exposed to air, either in a tunnel underground or dripping from a high exposed mine wall aboveground, pyrite converts into ferrous iron (Fe²⁺) and sulfuric acid (H⁺ and SO₄²⁻), [creating an acidic brew](#). If not contained, the drainage can seep into groundwater or into streams, harming the environment.

As part of Ohio's ash management plan, Butalia and Cheng are focusing on high-volume applications for the claylike desulfurization materials, such as using it as a treatment filter to remediate mine drainage. They found in lab tests that as acidic mine water passes through the alkaline material, the water is neutralized and many of the dissolved trace elements adsorb or precipitate and are trapped. The water that comes out the other side isn't perfectly clean, Cheng says, but the amounts of heavy metals of concern that remain are similar to those in streams or groundwater and typically below limits set for drinking water.

Butalia and Cheng are directing a test project in which some 500,000 tons of sulfite flue gas material from American Electric Power's Gavin Power Plant will be used to sop up acid mine drainage at an abandoned coal mine near the Ohio River. A layer of the material some 300 meters long and up to 60 meters wide will be placed against the mine wall to serve as a barrier through which the drainage must pass. The researchers estimate the barrier will provide more than 50 years of treatment capacity.

The circular nature of what they are doing hasn't escaped the Ohio State engineers. "The problems that arose before coal mining was regulated are now being addressed by using residues that come from burning coal," Butalia says. "These abandoned mine sites are an eyesore, a safety hazard, and an environmental liability for the state. The coal-combustion by-products are the same for utility companies. By diverting material that would otherwise go to a landfill and instead using it to improve the environment, we are addressing two problems with a synergistic solution."

Despite coal ash's promise, the environmental concerns of using the material are not going away. There's a case to be made for recycling coal ash into useful products, the Waterkeeper Alliance's Yaggi tells C&EN. "But it's our strong preference that coal no longer be burned to create electricity in the first place. Renewable energy has proven itself to be a viable alternative to dirty fossil fuels. That said, there is an enormous amount of coal ash, and current disposal methods leave waterways and communities at risk.

"We believe that encapsulated recycling of fly ash into concrete, if done properly, reduces the leaching of toxic materials and is the least environmentally problematic option," Yaggi continues. Unencapsulated recycling options for coal ash, including use in structural and mine fill, or as fertilizer or other agricultural materials, "pose unacceptable risks that we cannot endorse."

The Challenges Ahead

On Feb. 2, 2014, an aging storm drain ruptured at a coal ash pond at Duke Energy's retired [Dan River Steam Station](#) in Eden, N.C. The equipment failure sent some 132 million L of water laden with 70,000 tons of coal ash into the Dan River during the course of a week, fouling 100 km of the waterway. Duke Energy, following its 2012 merger with Progress Energy, is now the U.S.'s largest electric utility company.

Duke Energy and its predecessors have been criticized for years by environmental groups in the region for their handling of coal ash, including being unresponsive to leaky ash ponds at multiple sites. The environmental groups have also been up in arms over what they consider lax oversight by the [North Carolina Department of Energy & Natural Resources](#). Duke Energy and the state are now being forced to act, and their case exemplifies the challenges that lie ahead for coal ash.

In February 2015, Duke Energy was charged by federal authorities for violating the Clean Water Act and other regulations stemming from improper disposal of coal ash at multiple sites in North Carolina. The company entered a plea agreement to settle the matter with a \$102 million payment. The company has \$121 billion in assets.

To address the charges and to meet updated federal and state coal ash rules, [Duke Energy has created a plan](#) to close and remediate all 32 of its coal ash ponds in North Carolina, says company spokeswoman Catherine H. Butler. Deciding what to do with all the material isn't a snap. Each site is unique, requiring a customized solution for dewatering ponds and removing the ash, all while protecting groundwater and the surface environment, Butler says. The company anticipates spending as much as \$10 billion over 30 years for the remediation.

"As we develop our ash basin closure plans, our goal is to find opportunities to reuse that ash, rather than rebury it," Butler says. "And we are staying focused on our operating plants to increase the amount of ash recycled from them, so it doesn't have to be stored away."

For example, 3 million tons of Duke Energy ash currently stored in basins is being removed by [Charah](#), a construction company that specializes in coal [ash management](#). The ash is being used as structural material in lined basins to fill in [two open-pit clay mines](#) used by brick manufacturers in central North Carolina. The remediated land could be repurposed for future development, perhaps as an industrial site. In another project, Charah is placing more than 4 million tons of ash in a lined structural fill at the [Asheville Regional Airport](#) to build a new taxiway. "These three projects allow for a large amount of ash to be recycled in a short time frame," Butler says.

Duke Energy currently recycles 47% of the ash it produces at working coal power plants company-wide, but only 30% in North Carolina, both figures that the company aims to increase, Butler adds. Much of the coal ash goes to make concrete, she says. The company also has gypsum recycling operations at most of its operating coal plants. One exception is the company's plant in Edwardsport, Ind., where 99.9% pure sulfur is extracted from the flue gas. Duke Energy sells the sulfur into the chemical and fertilizer markets.

"That's a large portion of our ash that is not going into our ash basins," Butler says. "But we're aggressively exploring ways to safely reuse even more."

As part of its state regulatory requirements, Duke Energy has engaged the Electric Power Research Institute, a nonprofit R&D firm, to conduct a study, expected to be completed midyear, to understand the market demand for recycling coal ash with current uses and to identify emerging technology opportunities.

A Duke Energy team is already researching additional means to make coal ash more suitable for recycling, Butler notes. But the company has to balance cost and regulatory requirements, she explains. For example, to meet restrictions on nitrogen oxide and other emissions and still provide cheap power to benefit customers, power plants are sometimes limited in the type of coal they use and how they burn it. The combustion therefore might be incomplete, leaving unburned carbon in the ash. That can be a problem, because less than 2% carbon content is required to make concrete. "If we can't burn all the carbon out of the coal, the ash may not be suitable for recycling," Butler says.

The company is pursuing thermal beneficiation technology that would burn out the carbon to an acceptable level, allowing for both new and old ash to be treated and used in concrete products, Butler says. But the added cost could tip the scales against recycling. She concedes: "It's part of the push and pull of coal ash."

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Comments

Glenn (February 16, 2016 11:16 AM)

It's amazing how this coal ash is thrown into so many different products. Did the US and EPA not learn anything from the widespread use of asbestos when it was considered harmless.

» [Reply](#)

Steve Ritter (February 17, 2016 11:26 AM)

Thanks for your comment. It would seem encapsulating coal ash in concrete and roadway beds is a reasonable thing to do. As you note, the problem is when you disturb the material, such as tearing down a building, which was also the case with asbestos. Could smart construction, where you could disassemble buildings (wall and floor sections) without smashing them to bits, be the answer?

» [Reply](#)

T. Sobisch (February 17, 2016 2:44 AM)

Wonder about the idea of dumping ash in ponds under water. This obviously multiplies risk through mobilization of contaminants and flooding of the whole mass. Spraying the surface to avoid release of dust particles should suffice. Obvious solution to the problem face out coal fired power plants in line with the needs to save our planet. First stage reduce amount of ash to the level of possible recycling.

» [Reply](#)

Steve Ritter (February 17, 2016 11:34 AM)

Thanks for your comment. Pumping coal ash into a pond is a cost-effective way to handle the material and as you note keeps the material from becoming dust in the wind. As a silica-based material and being alkaline, fly ash in particular is a lung and skin health hazard. EPA with its new rule accepts ponds as a reasonable way to handle coal ash, but stipulates that companies must do better managing them to prevent environmental impacts. It would be nice to do without coal, but that is not yet practical, it would seem, without giving up some power.

» [Reply](#)

Horia Barbu (February 17, 2016 2:47 PM)

I've tried using wood ash to reduce AMD effect in ponds/landfills, and it works (at least at laboratory scale:-)) Maybe coal ash could be also use in this respect...

» [Reply](#)

Steve Ritter (February 17, 2016 6:00 PM)

Duke Energy has updated its estimate of the Dan River coal ash spill, from 70,000 tons of coal ash entering the river to 30,000 to 39,000 tons. North Carolina officials put it at about 38,000 tons.

» [Reply](#)

Phillip Flanders (February 19, 2016 1:38 PM)

I thought this was an interesting article. However, you state that the Ronald Reagan Building in DC was constructed using coal ash concrete, but you chose to show a picture of the William Jefferson Clinton Building, which is EPA's headquarters! I realize that the buildings are on the same block and that could be confusing. As you stated, reusing coal ash in concrete is somewhat common (16%), so are you implying that EPA is hypocritical for having recycled coal ash in its headquarters building, which you mislabeled?

» [Reply](#)

Steve Ritter (March 1, 2016 4:07 PM)

Thanks for your comment. Yes, the building shown is the Clinton building. The Reagan and Clinton buildings are on the same block next to each other sharing a courtyard, and both have concave facades on two sides that look similar. Turns out both buildings, as well as other Washington buildings and infrastructure projects, were constructed with concrete made using fly ash, according to ACAA. No implication intended regarding EPA's recycling. The agency likely had little say in the construction materials. EPA encourages reuse of coal ash, and has published a series of Comprehensive Procurement Guidelines recommending the use of various recovered materials. Fly ash for concrete was included in the first one.

» [Reply](#)

Warren A. Dick (February 22, 2016 10:47 AM)

An interesting article. There were a few statements that I think need to be corrected. One, the correct term, as you indicate, for all the products created from burning coal for energy is coal combustion products. Gypsum, one such product, does not contain coal ash but the article is misleading in grouping gypsum as an ash product. Two, gypsum does not neutralize acid in soil. This is a common misconception that I seem to have to correct over and over. Gypsum has many benefits in agriculture and farmers are using it to improve soil and water quality. Programs at The Ohio State University involve both engineering and agricultural uses of coal combustion products. Like any other agricultural amendment, use of gypsum must be properly conducted. From my experience, there is a desire to properly recycle coal combustion products from a wide range of groups. The main issue right now seems to be that any use of coal as a fuel is being opposed. One way to do that is to discourage beneficial recycling uses of the coal combustion products.

» [Reply](#)

Geoffrey Lindsay (February 28, 2016 10:18 PM)

Steve,

Can you tell us what the levels (ppm) of toxic metals are in fly ash / coal ash; and, for example, how do those levels compare to levels of those same toxic metals in natural gypsum, portland cement, beach sand, etc. To help solve this storage problem, has Congress mandated that coal ash be on all federal infrastructure work such as roads, bridges and buildings?

» [Reply](#)

Steve Ritter (March 1, 2016 4:31 PM)

Thanks for asking Geoffrey. It is hard to put a firm number on these levels, because it depends on the type of coal burned, combustion method, and type of coal combustion product. The minor components noted in fly ash in the graphic range from low parts per thousand for barium to low ppm or into the ppb range for uranium. It also is hard to compare those to natural materials, because it depends on the source of natural gypsum and lime and so forth. Congress has not mandated that coal ash be used in federal projects, but EPA encourages reuse of coal ash, and has published a series of Comprehensive Procurement Guidelines recommending the use of various recovered materials.

» [Reply](#)

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From: **Thomas Pakurar** handsacrossthelake@comcast.net

Subject: Re: Sampling in Farrar Gut additional documentation

Date: July 5, 2016 at 8:59 PM

To: Winter, Kyle (DEQ) Kyle.Winter@deq.virginia.gov

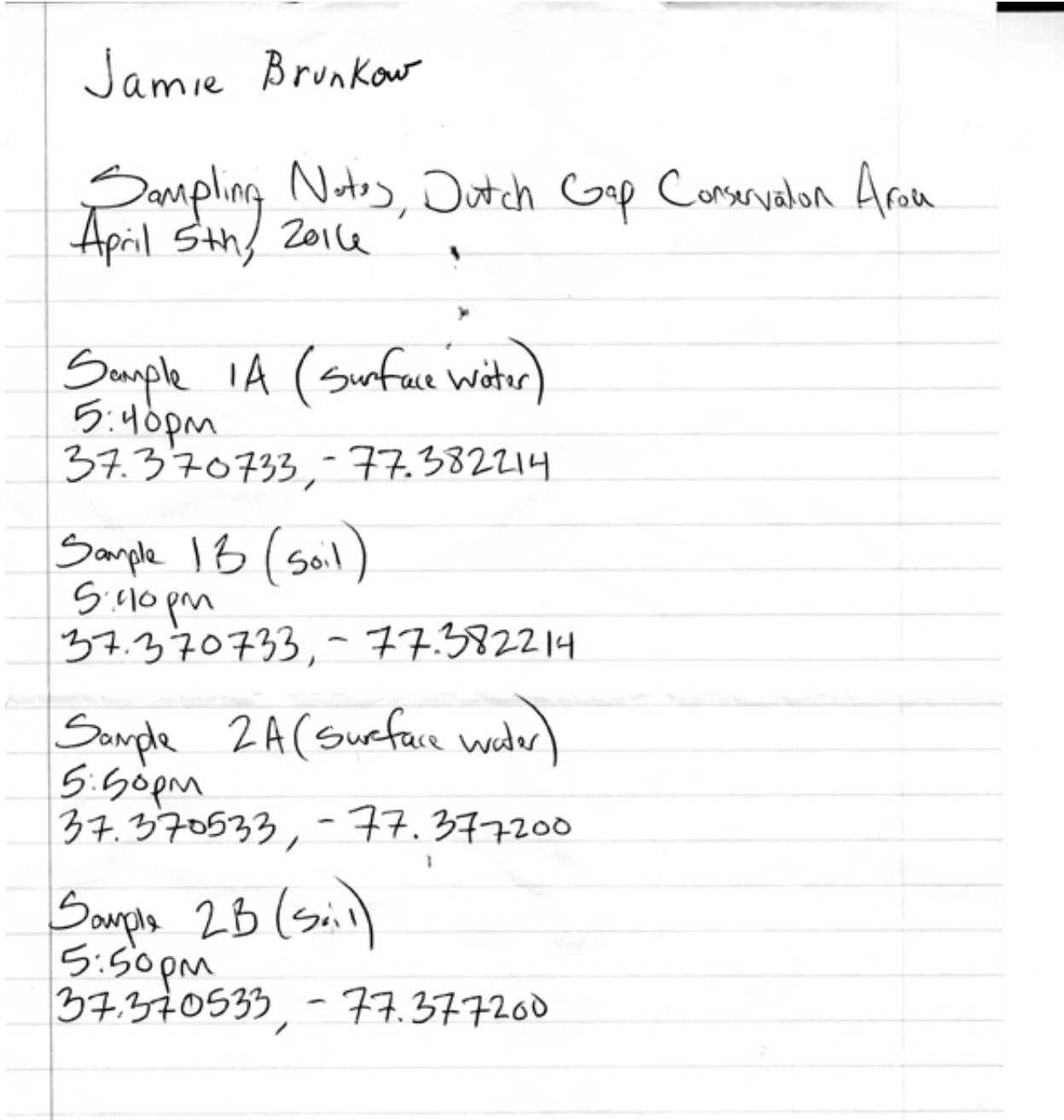
Cc: Adamson, Emilee (DEQ) Emilee.Adamson@deq.virginia.gov, Bob Olsen r.e.olsen@verizon.net, Peter N. Martin pnmartin@binary1.com, James Shelton James_Shelton32@yahoo.com

Bcc: Jameson Brunkow jbrunkow@jraa.org

TH

Mr. Winter:

I forgot to include the sampling notes in my previous email. They are now attached:



I believe I have included all the information you requested regarding Hands Across the Lake's sample 4/5/16 in Farrar Gut near the Dutch Gap fly ash storage place called "The Upper Pond." The sample was taken from the James River just downstream of the floating barriers near outfall #4 from the upper pond. Sampling protocols are described below:

1. Clean, new sampling 250 ml bottles were provided by the laboratory 2/29/16. The bottles contained a small quantity of UNCC stabilizing fluid and were sealed.

HNO₃ stabilizing fluid, and were sealed.

2. I provided two 500 ml and two 250 ml sample bottles to the person taking the samples on 3/17/2016.
3. Samples were taken 4/5/2016 at 5:40 pm at location 37.370733, - 77.382214. Sampling notes, and pictures of the sampling site are attached to this email. **HAL Sample ID is JBRU1A; Lab ID is 395425001.**
4. Samples were shipped FedX Ground and arrived 04/14/2016. Copies of the CoC and sample receipt form are attached.
5. In correspondence with the lab dated 3/1/16, the laboratory asked not to be identified by name in any press releases or public information releases. They requested they be referred to as "the lab performing the analysis is Virginia ELAP certified." Accordingly, I am redacting the lab data sheets to remove the laboratory name and address.
6. The sample detection limits for trace metals As, Cr and Pb were set at 1.7, 2.00, 0.500 µg/L respectively.

Additional information attached:

HAL summary data sheet updated 7/5/16
Lab chain of custody sheets
Lab certificate of analysis
Technical Narrative (5 pages)

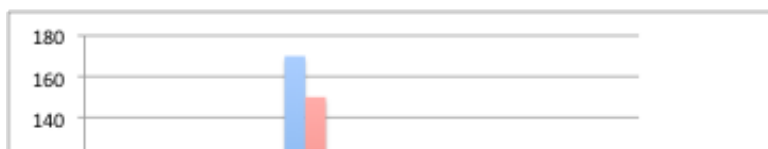
Sincerely,

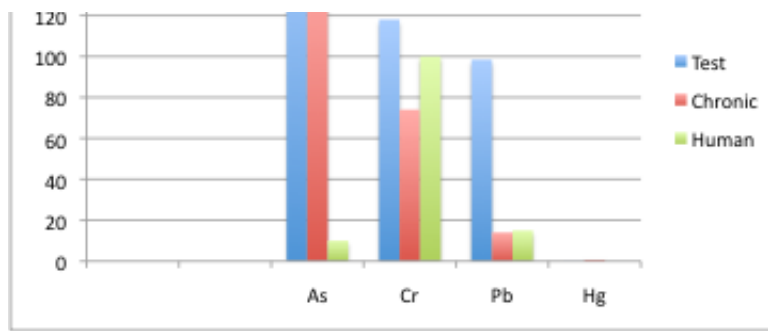
Thomas A. Pakurar, Ph.D.
Vice President - Science & Technology
Hands Across the Lake
P.O. BOX 1752
Midlothian, VA 23213
handsacrossthelake@comcast.net

Hands Across the Lake is a community based organization that tries to achieve win-win scenarios for business, public health and the environment.

Discharge water Upper Coal Ash Pond Sample from Public Waters downstream of Outfall #4

Sample ID/ Date	Metal	Test µg/L	Chronic µg/L	Human µg/L
Jbru 1A 4/5/16	As	170	150	10
	Cr	118	74	100
	Pb	98.4	14	15
	Hg	0.094	0.77	





Sample Location: 37.370733, - 77.382214

Thomas A. Pakurar, Ph.D.
Hands Across the Lake
P.O. BOX 1752
Midlothian, VA 23113
2016-07-05





Certificate of Analysis

Report Date: April 28, 2016

Company : Hands Across the Lake
Address : P.O. BOX 1752

Midlothian, Virginia 23213
Contact: Tom Pakurar
Project: Trace Metals - P16-0240

Client Sample ID: JBRU 1A
Sample ID: 395425001
Matrix: Water
Collect Date: 05-APR-16 17:40
Receive Date: 15-APR-16
Collector: Client

Project: HATL00116
Client ID: HATL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
EPA 245 Mercury "As Received"											
Mercury	J	0.094	0.067	0.200	ug/L	1	MTM1	04/20/16	1146	1560787	1
Metals Analysis-ICP-MS											
100.2/200.8 Metals As, B, Cd, Cr, Pb, Mo, Sb, Se, Tl "As Received"											
Antimony	J	1.58	1.00	3.00	ug/L	1	PRB	04/20/16	2020	1560238	2
Arsenic		170	1.70	5.00	ug/L	1					
Cadmium		3.34	0.110	1.00	ug/L	1					
Chromium		118	2.00	10.0	ug/L	1					
Cobalt		98.4	0.500	2.00	ug/L	1					
Colybdenum		9.34	0.165	0.500	ug/L	1					
Selenium		13.6	1.50	5.00	ug/L	1					
Thallium		3.52	0.450	2.00	ug/L	1					
Boron		289	20.0	75.0	ug/L	5	PRB	04/21/16	1834	1560238	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	JP1	04/15/16	2200	1560237
EPA 245.1/245.2 Prep	EPA 245 Mercury	AXS5	04/19/16	1400	1560786

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
	EPA 245.1/245.2		
	EPA 200.8		
	EPA 200.8		

Notes:

Containers for each test	Preservative Type (6)	Comments Note: extra sample is required for sample specific QC	Level 2 / Level 3 / Level 4 Collection Time Zone Pacific Other	ails	For Lab Receiving Use Only Curiosity Seal Intact? YES NO Cooler Temp: C
--------------------------	-----------------------	---	---	------	---

Chain of Custody and Analytical Request

Project #: **P-16-0240**
 GEL Quote #: **HAL CDC 2**
 COC Number: **HAL CDC 2**
 PO Number: **VISA**

Work Order Number: **99425**

Client Name: **THOMAS PAKURAR (HAL)** Phone #: **8046394454**

Project/Site Name: **COAL ASH** Fax #:

Address:

Collected by: Send Results To:

Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hh:mm)	QC Code	Field Filtered	Sample Matrix	Radioactive	TSCA Regulated	Should this sample be considered:	Total number of containers
SURFACE SEDIMENT	PLOH 1	4.5.16	1740						
JBRU 1A	JBRU 1B	1740							
JBRU 2A	JBRU 2B	1750							
PLOH 1	3.23.16	1730							
PLOH 2	PLOH 2SED	"	"						
PLOH 3	"	1745							
PLOH 8 SED	"	"							
JSTO 1 SW	JTSTO 1 SD	4.8.16	1800						
JSTO 2 SW	JTSTO 2 SD	4.6.16	1730						
JSTO 3 SW	JSTO 3 SD	4.6.16	1700						

**all 16 samples
metals and Hg**

SD samples dry basis

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards. Sample JBRU 1A - 15 sample of small micro particles floating on water surface, see black instructions via email, expect fly ash in sample.

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (Signed)	Date	Time
J. BRUNIKOW	4/16	902	J. BRUNIKOW	4/16	902
P. LOHR	4/16	540P	P. LOHR	4/16	1002
J. Stoneman	4/16	1002	J. Stoneman	4/16	1002

1) Chain of Custody Number = Client Determined
 2) QC Codes: N = Normal Sample, TB = Trip Blank, PB = Field Duplicate, KB = Trip Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
 3) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
 4) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SD=Soil, SD=Soil, SS=Sludge, SS=Solid Waste, O=Oil, P=Filter, P=Filter, U=Urine, P=Presat, N=Nasal
 5) Sample Analysis Requested: Analytical method requested (i.e. 8240B, 4010B/470A) and number of containers provided for each (i.e. 8240B - 3, 4010B/470A - 1).
 6) Preservative Type: MA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate. If no preservative is added - leave field blank.

WHITE = LABORATORY
 YELLOW = FILE
 PINK = CLIENT

SAMPLE RECEIPT & REVIEW FORM

Client: SDG/AR/COC/Work Order:

Received By: **H. Taylor** Date Received: **04/14/16**

Suspected Hazard Information

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

COC/Samples marked as radioactive? ☒ Maximum Net Counts Observed* (Observed Counts - Area Background Counts): **cpm**

Classified Radioactive II or III by RSO? ☒ If yes, Were swipes taken of sample containers < action levels?

COC/Samples marked containing PCBs? ☒ If yes, samples are to be segregated as Safety/Controlled Samples, and opened by the GEL Safety Group.

Package, COC, and/or Samples marked as beryllium or asbestos containing? ☒ Hazard Class Shipped: **UNH**

Shipped as a DOT Hazardous? ☒

Samples identified as Foreign Soil? ☒

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Ice bags Blue ice Dry ice None Other (describe)

within (0 ≤ 6 deg. C)?*		*All temperatures are recorded in Celsius 16	
2a	Daily check performed and passed on IR temperature gun?	Temperature Device Serial #: _____ Secondary Temperature Device Serial # (If Applicable): _____	
3	Chain of custody documents included with shipment?		
4	Sample containers intact and sealed?	Circle Applicable: Stalls broken Damaged container Leaking container Other (describe) _____	
5	Samples requiring chemical preservation at proper pH?	Sample ID's, containers affected and observed pH: _____ If Preservation added, List: _____	
6	Do Low Level Perchlorate samples have headspace as required?	Sample ID's and containers affected: _____	
7	VOA vials contain acid preservation?	(If unknown, select No)	
8	VOA vials free of headspace (defined as < 6mm bubble)?	Sample ID's and containers affected: _____	
9	Are Encore containers present?	(If yes, immediately deliver to Volatiles laboratory)	
10	Samples received within holding time?	ID's and tests affected: _____	
11	Sample ID's on COC match ID's on bottles?	Sample ID's and containers affected: _____	
12	Date & time on COC match date & time on bottles?	Sample ID's affected: _____	
13	Number of containers received match number indicated on COC?	Sample ID's affected: _____	
14	Are sample containers identifiable as GEL provided?		
15	COC form is properly signed in relinquished/received sections?		
16 Carrier and tracking number.		Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other	
		6536 8090 5925	
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials **HA**

Date **04/14/16**

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GL-CHL-SR-001 Rev 3

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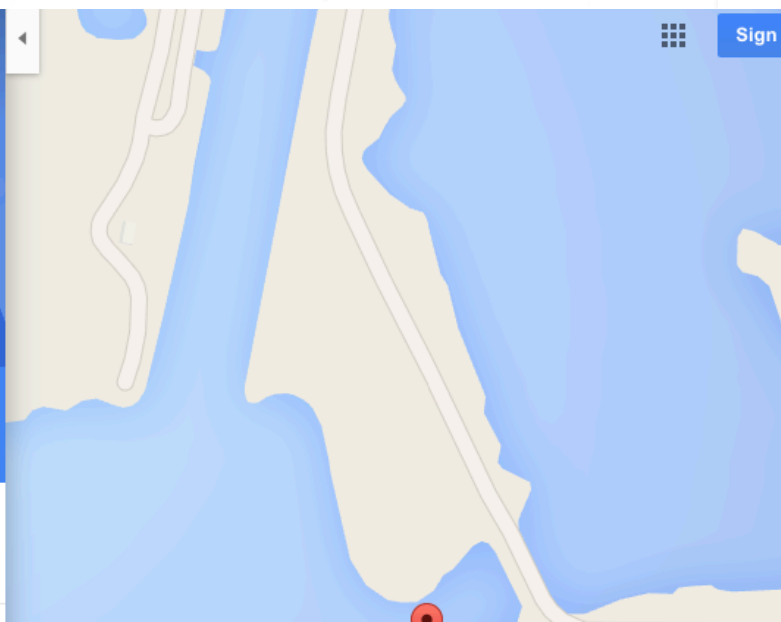
37.370733 - 77.382214

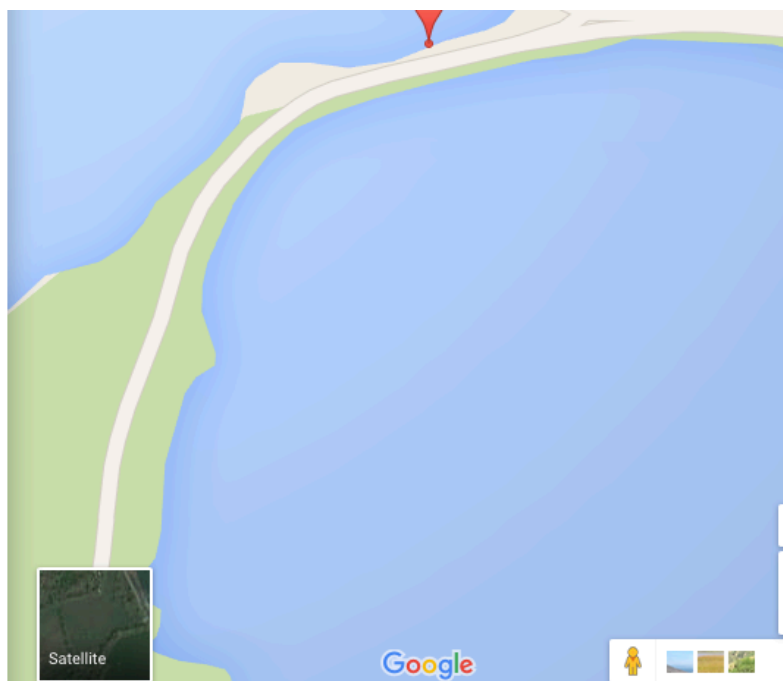


22°14.6"N 77°22'56.0"W

Directions

SAVE NEARBY SEND TO YOUR PHONE SHARE





Technical Information

Preparation/Analytical Method Verification

Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Product: Determination of Metals by ICP-MS

Analytical Method: EPA 200.8

Analytical Procedure: GL-MA-E-014 REV# 28

Analytical Batch: 1560238

Preparation Method: EPA 200.2

Preparation Procedure: GL-MA-E-016 REV# 15

Preparation Batch: 1560237

The following samples were analyzed using the above methods and analytical procedure(s).

<u>Sample ID#</u>	<u>Client Sample Identification</u>
395425001	JBRU 1A
395425002	JBRU 2A
395425003	PLOH 1
395425004	PLOH 2
395425005	PLOH 3
395425006	JSTO 1 SW
395425007	JSTO 2 SW
395425008	JSTO 3 SW
1203529445	Method Blank (MB)ICP-MS
1203529446	Laboratory Control Sample (LCS)
1203529449	395425001(JBRU 1AL) Serial Dilution (SD)
1203529447	395425001(JBRU 1AD) Sample Duplicate (DUP)
1203529448	395425001(JBRU 1AS) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and

Our sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Matrix Spike (MS/MSD) Recovery Statement

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analytes.

Sample	Analyte	Value
1203529448 (JBRU 1AMS)	Antimony	25.5* (75%-125%)

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	Arsenic	245* (75%-125%)
	Boron	169* (75%-125%)
	Chromium	140* (75%-125%)
	Lead	173* (75%-125%)

Technical Information

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample 395425001 (JBRU 1A) was diluted to ensure that the analyte concentration was within the linear calibration range of the instrument.

	395425
Analyte	001
Boron	5X

Product: Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Analytical Method: SW846 7471A

Analytical Procedure: GL-MA-E-010 REV# 31

Analytical Batch: 1560783

Preparation Method: SW846 7471A Prep

Preparation Procedure: GL-MA-E-010 REV# 31

Preparation Batch: 1560779

The following samples were analyzed using the above methods and analytical procedure(s).

Sample ID#	Client Sample Identification
395425009	JBRU 1 B
395425010	JBRU 2 B
395425011	PLOH 2 SED
395425012	PLOH 8 SED
395425013	JTSTO 1 SD
395425014	JTSTO 2 SD
395425015	JSTO 3 SD
395425016	JSTO 4 SED
1203530976	Method Blank (MB)CVAA
1203530977	Laboratory Control Sample (LCS)
1203530980	395298003/NonSDXG1 \ Serial Dilution (SDX)

1203530978	395298003(NonSDGD) Sample Duplicate (DUP)
1203530979	395298003(NonSDGS) Matrix Spike (MS)
1203530983	395298003(NonSDGPS) Post Spike (PS)

The samples in this SDG were analyzed on an "as received" basis.

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Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Matrix Spike (MS/MSD) Recovery Statement

The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1203530979 (Non SDG 395298003MS)	Mercury	41.8* (80%-120%)

Product: Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Analytical Method: EPA 245.1/245.2

Analytical Procedure: GL-MA-E-010 REV# 31

Analytical Batch: 1560787

Preparation Method: EPA 245.1/245.2 Prep

Preparation Procedure: GL-MA-E-010 REV# 31

Preparation Batch: 1560786

The following samples were analyzed using the above methods and analytical procedure(s).

<u>Sample ID#</u>	<u>Client Sample Identification</u>
395425001	JBRU 1A
395425002	JBRU 2A
395425003	PLOH 1
395425004	PLOH 2
395425005	PLOH 3
395425006	JSTO 1 SW
395425007	JSTO 2 SW
395425008	JSTO 3 SW
1203530993	Method Blank (MB)CVAA
1203530994	Laboratory Control Sample (LCS)
1203530997	395253001(NonSDGL) Serial Dilution (SD)
1203530995	395253001(NonSDGD) Sample Duplicate (DUP)
1203530996	395253001(NonSDGS) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration,

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continuing calibration, instrument controls and process controls where applicable.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.